5 EDITION

CRIME ANALYSIS WITH CRIME MAPPING

RACHEL BOBA SANTOS

Crime Analysis With Crime Mapping

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Preface

My purpose in this book is to introduce crime analysis and the profession through discussion of the concepts, theories, practices, data, analysis techniques, and the role of crime analysis in policing. I do not cover details on the types of current software products or technology because the rate of change of these is high, so they are difficult to keep up with when publishing a book. More importantly, however, the foundation, fundamental practices, and analytical techniques have not substantively changed over the years even with the advancement in technologies, and in my opinion, will not in the future. My approach in this book is to provide students and crime analysts the research background, knowledge, and practical perspective so they take what they have learned here and conduct effective crime analysis that supports crime reduction and operations of a police department "out of the gate."

In this vein, the fifth edition makes a shift that focuses on streamlining content, centering crime analysis practice in proactive crime reduction by police even more than in previous editions, and providing instruction on the logic behind tested crime analysis techniques and products. The new flow of the book comes from the collaborative work I have done with my husband, Dr. Roberto Santos, as we created and have implemented the approach called Stratified Policing in agencies throughout the United States (Santos & Santos, 2020b, pp. 5–6):

> Stratified Policing changes the organizational culture and incorporates proactive crime reduction into everyday operations that are organized, systematic, and fair in the distribution of work and responsibility. Ultimately, an agency improves communication up, down, and across the organization, enhances transparency, and establishes clear accountability for carrying out proactive activities. Stratified Policing provides a framework that translates these ideas to institutionalize concrete concepts. They include the integration of evidence-based strategies as well as the stratification of crime and disorder problems, of crime analysis, of responsibility by rank, and of accountability. These concepts are translated even further into cohesive and consistent methods for approaching organizational change and implementing tangible processes and practices. The

> methods include developing agency crime reduction goals; systematic identification and analysis of problems; tailored evidence-based responses; assessment; and accountability meetings.

Stratified Policing is an approach that every crime analyst and crime analysis student should *celebrate* because crime analysis is at its core and is indispensable. I think it is worth including an excerpt of Roberto's and my discussion of the role of crime analysis in proactive crime reduction from our new book entitled, *Stratified Policing: An Organization Model for Proactive Crime Reduction and Accountability* (Santos & Santos, 2020b, pp. 48–49):

> It is the well-defined crime-analysis products that trigger a specific process at each problem level. Crime analysis is stratified in the framework by problem as well as by purpose. That is, for each level of problem different analysis products are required, and every product either is "action oriented" or "evaluation oriented." The crime analysis results either lead to a range of specific evidence-based responses or assess whether they are effective. Even further, the role of crime analyst is vital as they become the "voice of the chief" and the "truth teller." It is not realistic for the chief to decide and assign each level of problem to different people in the agency on a consistent basis. So, using the agency goals, criteria, and processes set by the chief and executive staff, crime analysts dictate the day-to-day crime reduction efforts of the entire organization with specific analytical products. When crime analysis products are disseminated for crime reduction, individuals in the organization understand it is not crime analysts who decide what is important, but what they are getting is essentially identified and assigned to them by the chief. In terms of evaluation, because the chief also decides the criteria for success, crime analysis products establish what is working through ongoing monitoring of problems and evaluation statistics. As the "truth tellers" of the agency, crime analysts identify, analyze, and evaluate problems…On behalf of the chief, crime analysts provide specific products to better understand the problem and to determine if the responses are working.

So, it is through the work and discussions that Roberto and I have had over the last 18 years implementing Stratified Policing and refining crime analysis processes and products for police that this edition has evolved. We worked together on this edition of the book to change its flow and content to ensure that students and crime analysts are prepared to be an integral part of their department's efforts to address and reduce crime.

That being said, the overall changes in this edition are centered in providing a wealth of practical examples from crime analysts who are working effectively in police departments to support their crime reduction efforts as well as connecting crime analysis more closely to the problem-solving process and evaluation of police efforts. The "basics" are still included about data, mapping, and technology, but additional instruction on specific product development, examples, and dissemination strategies are emphasized.

The book is divided into four parts. Part I covers the foundations of crime analysis, including key definitions, a description of the crime analysis profession and its future, theoretical foundations of crime analysis, and the role of crime analysis in evidence-based policing strategies. Part II addresses the data and processes used in crime analysis, type of crime analysis, geographic data and crime mapping techniques, and the types and requirements for crime analysis products. Part III covers the methods and techniques of tactical crime analysis, and Part IV provides methods and techniques of strategic crime analysis.

The chapters in Part I lay the foundation for the rest of the book. Chapter 1 presents definitions of crime analysis and discusses the history and future of crime analysis. It also includes information on crime analysis career opportunities and profiles of working analysts. Chapter 2 provides an overview of the criminological theories that help to guide the practice of crime analysis. Chapter 3 has been updated with current research about the four effective police approaches (i.e., place-based, person-focused, problem-solving, and community-based) and the role of crime analysis in each. It also includes a discussion of the framework and definitions for crime problems developed for Stratified Policing and the problem-solving process (SARA) which set the stage for Parts III and IV.

The four chapters that make up Part II are devoted to the topics of the data and processes used in crime analysis, geographic data and crime mapping techniques, and crime analysis products. Chapter 4 discusses the crime analysis process and the different types of crime analysis. Chapter 5 provides a review of key terms, a discussion of the kinds of data commonly used and databases commonly accessed in crime analysis, information on what analysts must consider when using different kinds of data for analysis, and a brief overview of hardware and software commonly used in crime analysis. Chapter 6 introduces geographic data, types of geographic features, geocoding, descriptive crime mapping methods, and density mapping. Chapter 7 is new and illustrates the most common crime analysis products, their components, and examples as well as a discussion of how and to whom crime analysts disseminate their results.

The chapters in Part III describe the data, methodologies, techniques, and products of tactical crime analysis. Chapter 8 has been totally reworked to

bring together an in-depth discussion of calls-for-service data and its uses and the step-by-step process of repeat incident analysis and assessment. Chapter 9 now synthesizes the in-depth discussion of crime report and field information data used for pattern analysis and the methodologies analysts employ in identifying and finalizing patterns. Chapter 10 lays out the nature of persons and property crimes, their differences, and key characteristics for identifying crime patterns. It illustrates each crime type with updated examples from patterns identified by working analysts. Chapter 11 now focuses on crime pattern bulletin creation and dissemination, police response to crime patterns, and evaluation of those responses.

Finally, Part IV concentrates on the purpose and methods of strategic crime analysis. Chapter 12 covers statistics used by crime analysts and includes an entirely new section on trend analysis and common products crime analysts create for that purpose. Chapters 13 and 14 have been updated and streamlined to focus on the identification and analysis of long-term crime problems—problem locations, areas, offenders, victims, and products. Chapter 15 is completely updated with a discussion of how crime analysts develop recommendations for long-term problem responses, apply process and impact evaluation methods, and create specific products for assessing problem responses and evaluating an agency's crime reduction goals.

By no means does this book cover all facets of crime analysis; however, it does lay a solid foundation for students' and crime analysts' understanding of the conceptual nature and practice of crime analysis that assists police in preventing and reducing crime and disorder. It provides an in-depth description of this important field and guidelines for the practice of crime analysis that are based on research, practice, and innovative approaches. It also provides opportunities for students to explore possible future careers that support and enhance the effectiveness of modern policing.

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About the Author

Rachel Boba Santos is a professor of Criminal Justice and codirector of the Center for Police Practice, Policy and Research at Radford University, in Radford, VA. She assists and partners with police departments around the world to implement Stratified Policing and improve their crime reduction efforts, crime analysis, accountability, and community engagement. Taking both an evidence-based and practice-based approach, her research focuses on the effectiveness of proactive crime reduction efforts by police, institutionalizing community engagement by police, crime analysis, and effective implementation of technology that supports crime analysis and crime reduction.

PART I

Foundations of Crime Analysis

Part I contains three chapters that provide a practical and theoretical foundation for the field of crime analysis. Chapter 1 defines *crime analysis* as well as *crime mapping* and *geographic information systems* (GIS), describes the history of the crime analysis profession, and ends with specifics about the crime analysis profession and crime analysis units. Chapter 2 outlines the theoretical concepts that are most relevant for crime analysis by focusing on understanding the opportunities for crime in immediate crime settings. Chapter 3 provides the policing context in which crime analysis is conducted by reviewing the research on effective (i.e., evidence-based) proactive policing crime reduction approaches and outlining a framework for organizing crime analysis work. Together, these chapters provide knowledge about the profession, its theoretical foundations, and its role in crime reduction.

CHAPTER 1

Crime Analysis and the Profession

It is important to understand that "crime analysis" as it is practiced in policing does not literally mean simply the analysis of crime. The term refers to a much broader concept, practices, and a profession. Crime analysts support all major functions within police agencies and examine much more than crime data, such as disorder, calls for service, quality-of-life issues, traffic crashes, critical incidents, and, less often, census information, fire and emergency medical incidents. However, crime analysis does not include evidence analysis (e.g., DNA, stolen property), human resources–related administrative analysis (e.g., budgeting, overtime, sick and vacation leave, salary), or analysis of supplies and equipment.

In this context, the terms "police agencies" or "police departments" encompass organizations with general law enforcement authority (i.e., with patrol, investigative, emergency response, prevention, and community service functions) and include municipal and local police departments, metropolitan police departments, county police departments, county sheriff offices, state police agencies, and university police agencies within the United States. It also includes national, provincial, and regional police agencies with local-level police responsibilities outside the US.

DEFINITION OF CRIME ANALYSIS

According to the IACA (2014, p. 2), **crime analysis** is defined as the following:

> A profession and process in which a set of quantitative and qualitative techniques are used to analyze data valuable to police agencies and their communities. It includes the analysis of crime and criminals,

crime victims, disorder, quality of life issues, traffic issues, and internal police operations, and its results support criminal investigation and prosecution, patrol activities, crime prevention and reduction strategies, problem solving, and the evaluation of police efforts.

Crime analysis is not haphazard or anecdotal; rather, it is based in theory and involves the application of social science data collection procedures, analytical methods, and statistical techniques. More specifically, crime analysis employs both qualitative and quantitative data and methods. Crime analysts use **quantitative data and methods** when they conduct statistical analyses of numerical or categorical data. Although much of the work in crime analysis is quantitative, crime analysts primarily use fundamental statistical methods, such as frequencies, percentages, means, and rates. Crime analysts use **qualitative data and methods** when they examine nonnumerical data for the purpose of discovering underlying causes of crime. The qualitative methods specific to crime analysis include field research (such as observing characteristics of locations and talking to individuals with specific knowledge about a particular type of crime) and content analysis (such as examining police report narratives).

The central focus of crime analysis is the study of crime (e.g., rape, robbery, and burglary), disorder problems (e.g., disturbances, juvenile trouble, trespassing/loitering, suspicious activity), traffic-related issues (e.g., traffic collisions and citations), as well as information related to the nature of incidents, offenders, and victims, property, or targets. Crime analysts study other police-related operational issues, such as assisting to determine staffing needs, resource allocation, and determining geographic areas of police service.

Although many different characteristics of crime and disorder are relevant in crime analysis, three key types of information crime analysts use are sociodemographic, spatial, and temporal. Sociodemographic information consists of the personal characteristics of individuals and groups, such as sex, race, and age. On an individual level, crime analysts use sociodemographic information to search for and identify crime suspects and victims. On a broader level, they use such information to determine the characteristics of groups and how these group characteristics are related to crime. For example, analysts may use sociodemographic information to answer the question "Is there a White, male suspect, 30–35 years of age, with brown hair and brown eyes to link to a particular robbery?" or "Can demographic characteristics help explain why certain individuals are victimized more often in tourist areas?"

The spatial nature of crime, disorder, and other police-related issues is central to understanding the nature of a problem. Advanced computer technology and the availability of electronic data have facilitated a large role for spatial analysis in crime analysis. Visual displays of crime and disorder locations

(maps) and their relationship to other events and geographic features are essential to understanding the nature of crime and disorder. Results from criminological research within an area called "crime and place" (Weisburd, 2015) encourage crime analysts to focus on geographic patterns of crime by examining situations in which victims and offenders come together in time and space.

The temporal nature of crime, disorder, and other police-related issues is a major component of crime analysis. Crime analysts conduct several levels of temporal analysis, including examination of long-term trends of crime and disorder over several years, by season, and by day of week and time of day. This book will take a close look at specific analysis techniques used to examine the temporal nature of crime at each of these levels. The primary purpose of crime analysis is to support the operations of a police department. Without police, crime analysis would not exist.

DEFINITIONS OF GIS AND CRIME MAPPING

Ever since maps have been available that depict the geographic features of communities, such as streets and city boundaries, police departments have used such maps to determine patrol areas and emergency routes and to assist patrol officers in finding specific addresses. Crime analysts also use maps as a key tool. Historically, mapping for crime analysis involved the manual placement of pins to represent crimes on hand-drawn wall maps. Since the 1990s, significant improvements in technology, software, electronic databases, and the Internet along with police innovation have made crime mapping by police agencies extremely common.

Every crime analyst uses mapping software to visualize the spatial nature of crime. A **geographic information system (GIS)** is a set of computer-based tools that allows the crime analyst to modify, visualize, query, and analyze geographic and tabular data. A GIS is similar to a spreadsheet or word processing program in that the software provides a framework and templates for data collection, collation, and analysis. It is up to the crime analyst to decide what parts of the system to use and how to use them. A GIS does more than enable crime analysts to produce paper maps; it allows them to view the data behind geographic features, combine various features, manipulate the data and maps, and perform statistical functions.

Crime mapping is a term used in policing to refer to the process of conducting spatial analysis of crime and is the process of using a geographic information system to examine the spatial nature and relationships of crime and disorder problems as well as other police-related issues. Clarifying where different types of crime and other types of incidents occur is one of the many important functions of crime analysis. Crime mapping serves three main functions within crime analysis:

1. It facilitates visual and statistical analyses of the spatial nature of crime, disorder, and other types of events.
2. It allows analysts to link unlike data sources based on common geographic variables (e.g., linking census information, school information, and crime data for a common area).
3. It provides maps that help to communicate analysis results.

HISTORY OF CRIME ANALYSIS

The history of the "analysis of crime" is long, but the history of crime analysis as a discipline begins with the first modern police force, which was created in London in the early 19th century. This makes sense, given the main purpose of crime analysis is to assist the police. Through the Metropolitan Police Act, passed in the 1820s, England organized about a thousand men to form a London police force. In 1842, this force created a detective bureau, which was given the responsibility of identifying crime patterns to help solve crimes. By 1844, the detective bureau's officers were collecting, collating, and analyzing police information, for example:

> 1844: Richard Mayne, Commissioner [was] called to give evidence to the Select Committee on Dogs. He stated that in the Metropolis there were a rising number of lost or stolen dogs. In the preceding year over 600 dogs were lost and 60 stolen. He declared the law to be in a very unsatisfactory state as people paid money for restoration of dogs. "People pay monies to parties whom they have reason to believe have either stolen or enticed them away in order to get the reward … " Mayne believed it to be organized crime.
>
> (Friends of the Metropolitan Police Heritage Charity, 2021)

Aggregate crime statistics were available for the city of London as early as 1847; that year, there were "14,091 robberies; 62,181 people taken in charge, 24,689 of these were summarily dealt with; 5,920 stood trial and 4,551 were convicted and sentenced; 31,572 people were discharged by the magistrates" (Friends of the Metropolitan Police Heritage Charity, 2021).

United States: 1900–1970

Although many large cities in the United States began to create police departments in the mid-1850s, a lack of organization and technology prevented them from conducting crime analysis systematically. The first indication of an instance of formal crime analysis in the United States is found in the early 1900s. August Vollmer, the most famous police reformer, in addition to

instituting the innovations of vehicle patrol, radio communication, and fingerprinting, encouraged the use of pin mapping, the regular review of police reports, and the formation of patrol districts based on crime volume (Reiner, Greenlee, & Gibbens, 1976).

O. W. Wilson, who worked with Vollmer and created an advanced training program for officers, was the first to mention and define the term *crime analysis* in the second edition of his book *Police Administration* in 1963. In 1977, Wilson and McLaren distinguish between "operations" analysis and "crime" analysis, asserting crime analysis is the "process of the identification of crime trends and patterns through statistical treatment of information and through examination of actual investigative reports" (p. 175).

From Wilson's writings, it appears crime analysis was being conducted in (or at least was recommended to) police departments in the 1950s and 1960s; however, no evidence of crime analysis is available from that period. In *Police Planning* (1957), Wilson discusses crime mapping and crime analysis, although he does not use those terms. He outlines the structure of police planning to include a "cartography unit," which among other things "provides technical advice… in depicting crime trends or occurrences… in located places of arrest" and a "statistics unit," which includes many of the functions of crime analysis that are still practiced today, such as "interpreting and disseminating crime statistics and other related material to be used as aids for more effective and efficient operation of the department; preparing statistical charts, graphs, and artwork as needed by other department units" and "maintaining and operating the modus operandi files" (Wilson, 1957, p. 10).

United States: 1970–2000

The 1968 Omnibus Crime Control and Safe Streets Act brought about increased awareness of the use of analysis and evaluation in policing throughout the 1970s. The act allowed the allocation of federal grants to assist state and local police agencies with any purpose associated with reducing crime. The US Bureau of Justice Administration, established by the act for the general purpose of supporting police agencies, provided extensive assistance, helping police departments establish evaluation programs and providing training, technical assistance, and information to support the work funded by the grants (Omnibus Crime Control and Safe Streets Act of 1968; Pomrenke, 1969).

As a result, publications from the 1970s about crime analysis techniques as well as evaluations of crime analysis functions indicate police departments had begun to take Vollmer's and Wilson's advice to formalize crime analysis. During this time, there were many handbooks published which were devoted to the techniques of tactical and strategic crime analysis (Emig, Heck, & Kravitz, 1980). They included examples, such as *Police Crime Analysis Unit Handbook* (Austin et al., 1973); *Management Function of a Crime Analysis*

Unit (Booth, 1979); *Crime Analysis System Support: Descriptive Report of Manual and Automated Crime Analysis Functions* (Chang, Simms, Makres, & Bodnar, 1979).

During the 1970s, the US government brought academics and practitioners together to work on specific technical assistance projects aimed at increasing the crime analysis capabilities of police agencies (Emig et al., 1980). Popular media sources also provide evidence that formal crime analysis units existed during this period. For example, an article from *The New York Times* published in 1972 mentions crime analysis: "Crime analysts at NYC Police HQ say on July 21 that record 57 homicides in 7-day period that ended at midnight July 20 is attributed partly to hot weather in met area" (Pace, 1972).

In the mid- to late 1970s, a small group of academics began to emphasize the importance of the characteristics of criminal events, how they occur, and the geographic analysis of crime (discussed in Chapter 2). In the late 1970s, Herman Goldstein (1979) developed problem-oriented policing (discussed in Chapter 3) which shifted the focus of the police from administrative and political concerns to an emphasis on addressing crime and disorder problems. Goldstein and other scholars who were working with police agencies began to demonstrate the analysis of crime and disorder problems.

Growing recognition of crime analysis in the police practitioner community around this time is evidenced by the creation of the **Commission on Accreditation for Law Enforcement Agencies (CALEA)** in 1979.[1] To receive CALEA accreditation, police agencies were required to have crime analysis capabilities. In fact, CALEA accreditation increased the likelihood of having a formal crime analysis unit (Giblin, 2006) since agencies began to designate personnel to crime analysis and created new positions to meet the CALEA standards.

Crime analysis practitioners began to organize in the 1980s and early 1990s. The Colorado Crime Analysis Association, the first state association on record, was formed in 1982. It consisted of an active group of professionals who benefited from the sharing of tools and techniques. In 1989, the California Crime Analysis Association was founded and by 1990 the **International Association of Crime Analysts (IACA)** was created by analysts from Arizona, Colorado, Texas, Oklahoma, Georgia, Missouri, and Ontario.

In the early to mid-1990s, the discipline of crime analysis grew slowly in the United States. In his 1990 book, *Problem-Oriented Policing,* Herman Goldstein further specified the role of crime analysis he described in his 1979 article, outlining the importance of police agencies using data and research to identify problems, understand their underlying causes, and evaluate crime prevention programs.

A number of other events that occurred in the mid-1990s fostered the expansion of crime analysis. The philosophy of community policing

(discussed in Chapter 3), which was being adopted by departments across the country, emphasized problem-solving (the process described by Herman Goldstein) as well as partnerships between police departments and the citizens they serve which involved the sharing of crime information and statistics. In 1994, the New York City Police Department's conception and implementation of CompStat (discussed in Chapter 3), a data-driven and mapping-driven police management strategy also used in other departments in subsequent years, increased both awareness of crime analysis and its incorporation into the everyday functions of the police (Weisburd, Mastrofski, McNally, Greenspan, & Willis, 2003). Also in 1994, the Violent Crime Control and Safe Streets Act, which amended the 1968 Omnibus Crime Control and Safe Streets Act, created the Office of Community Oriented Policing Services (known as the COPS Office). By 1997, the COPS Office provided a significant number of grants to police department aimed at providing substantive as well as technological support of crime analysis, crime mapping, and community policing.

In the 1990s, enormous increases were seen in the speed and memory of computers, and the creation of the Windows operating system had a significant impact on crime analysis practices. These changes made it much easier for police to house official information electronically and analysts to examine large amounts of data using desktop statistical programs and crime mapping software to clean data and to generate reports.

In the 1980s and early 1990s, practitioners focused on providing police agencies with statistical information about long-term trends as well as recommendations for organizational procedures stemming from the work of policing planning units (i.e., strategic crime analysis). The identification of short-term crime trends and patterns (i.e., tactical crime analysis) became more widespread in medium-to small-sized agencies during the mid-1990s. This was in part a result of assigning crime analysts to geographic patrol areas or to criminal investigations, training in specific pattern identification techniques, and a renewed emphasis for crime analysts on the police goal of apprehending criminals.[2]

HISTORY OF CRIME MAPPING

Even though crime mapping plays a significant role in crime analysis today, conducting spatial analysis and creating crime maps for distribution have become common over the last two decades in policing and crime analysis, thanks to advancements in technology. The history of crime mapping is somewhat distinct from that of crime analysis and begins not with the establishment of the first police force, but with the work of researchers long before the invention of computers.

In the 1800s, European researchers adhering to the cartographic school of criminology examined crime within different geographic regions and its

relationship to sociological factors, such as socioeconomic status (Groff & La Vigne, 2002). For example, in 1829, Adriano Balbi, an ethnographer and geographer, and André-Michel Guerry, a lawyer, created the first maps of crime using criminal statistics for the years 1825–1827 and demographic data from the census. They examined crime and education in France and found areas with high levels of property crime had a low incidence of persons crimes and higher numbers of educated people lived in areas with more property crime (Weisburd & McEwen, 1997). The Belgian astronomer and statistician Quételet used maps to examine correlations between crime and transportation routes, education levels, and ethnic and cultural variations (Weisburd & McEwen, 1997).

United States: 1900–1970

In the United States, crime mapping began a little later than it did in Europe. The United States was a relatively new country in the 1800s, so reliable maps were not readily available and census data were not collected as they were in France and England at that time. One of the first spatial analyses of crime in the United States was conducted in the 1920s and 1930s by urban sociologists in Chicago (Shaw & McKay, 1969). Their crime research and related crime maps linked crime and delinquency to factors such as social disorganization and poverty. In fact, these scholars' spatial analysis of juvenile delinquency and social conditions in Chicago is considered to be one of the foremost examples of crime mapping in the first half of the 20th century (Groff & La Vigne, 2002).

Crime mapping was an important component in the development of Shaw and McKay's concentric zone model, which asserts in urban settings different types of areas form around a central business district and some of these areas are more prone to crime than others. Researchers tested the model in Chicago and found gangs and crime were concentrated in parts of the city where social control was weak and social disorganization was high (Weisburd & McEwen, 1997). They found it was not necessarily the nature of the individual but the nature of the area that was related to higher levels of crime. As illustrated in these examples, most of the crime mapping conducted in Europe and the United States examined aggregate levels of crime by area.

Through the 1950s, 1960s, and 1970s, sociologists and others who were interested in crime and its causes continued to examine the sociological factors associated with aggregate crime levels. The explanations and geographic methods of analysis used remained fairly uncomplicated during this period, possibly owing to the researchers' focus on sociological factors and the lack of adequate technology (Groff & La Vigne, 2002). In the late 1960s, scholars began conducting spatial analysis of crime incident locations with the help of large computer systems and unsophisticated visualization methods (Weisburd & McEwen, 1997).

United States: 1970–2000

From the late 1960s through the early 1980s, a small group of researchers in England, Canada, and the United States shifted from focusing exclusively on the criminal offender to studying the criminal event and its context, including the physical and social environments that create opportunities for crime (discussed in Chapter 2). These researchers began using mapping to analyze discrete crime locations and incorporating information about geography and environment into their study of crime problems and related issues, such as rape (LeBeau, 1987) and a host of other crimes (Harries, 1980) as well as distribution of police personnel (Rengert & Wasilchick, 1985).

In the early to mid-1990s, significant improvements in computer technology and police data systems made electronic crime mapping a much more practical tool for police and researchers. GIS software became available for desktop computers as these computers became capable of processing large amounts of data quickly. Police data on crimes, arrests, traffic crashes, and calls for service became available electronically through computer-aided dispatch systems as well as through electronic records management systems. Geographic data such as street and census information became widely available in electronic format and were provided free or at minimal cost by a variety of government agencies and commercial organizations. All of these developments helped to advance the field of crime mapping beyond manual methods and the use of large, costly mainframe mapping systems.

Around this time, the federal government, in a movement spearheaded by Vice President Al Gore, provided increased support for crime mapping technology and methods. Police agencies received federal funding to obtain crime mapping technology, and several programs were developed specifically to assist police agencies with the implementation of crime mapping. The COPS Office allocated a significant amount of funding for crime mapping software and equipment through a program called MORE (Making Officer Redeployment Effective). From 1995 to 2002, just over $53 million (90 individual grants) of MORE funding was allocated directly to crime mapping technology and staff (M. Scheider, personal communication, November 10, 2003).

The Crime Mapping Research Center, later called the Mapping and Analysis for Public Safety (MAPS) program, was formed within the Department of Justice's National Institute of Justice in 1997. Its goal was to support research that helps criminal justice agencies by examining how to (1) use maps to analyze crime, (2) analyze spatial data, (3) use mapping to evaluate programs and policies, and (4) develop mapping, data sharing, and spatial analysis tools. Since its creation, the program has held annual conferences at which practitioners and researchers come together to discuss research and spatial analytic techniques. Other activities have included funding spatial analysis research and fellowships, a national survey of crime mapping, developing training curricula, publishing books on crime mapping, and bringing together

police professionals and researchers in a technical working group to discuss spatial analysis of crime issues. From 1998 to 2007, the National Institute of Justice also funded the Crime Mapping and Analysis Program (CMAP), the mission of which was to provide technical assistance and introductory and advanced training to local and state agencies in the areas of crime and intelligence analysis and GIS.

An important influence in the use of crime mapping in policing was CompStat, the data- and mapping-driven police management strategy created by the New York City Police Department in 1994 and adopted by many more police agencies across the United States (Police Executive Research Forum, 2013). Crime mapping, and more generally crime analysis, is a core component of CompStat-like programs. Maps are used for illustrating up-to-date crime locations and high-crime areas within specific geographic areas. Statistical tables are a crucial part of CompStat's accountability mechanism to assess the performance and impact of the geographic area commander's crime reduction strategies (Silverman & Eterno, 2019). Finally, a study done on the rate of crime mapping adoption in the 1990s concluded, "crime mapping was widely diffused among police agencies, that the diffusion process began in the late 1980s to early 1990s, it gained momentum in the mid-1990s, and that the adoption of crime mapping appears to follow the standard 's' curve of diffusion of innovation" (Weisburd & Lum, 2005).

RESEARCH ON CRIME ANALYSIS AND CRIME MAPPING: 2000 TO PRESENT

Starting around the late 1990s, researchers began looking more closely at crime analysis in police departments and the crime analyst profession to understand the prevalence and nature of how it is practiced. A systematic study conducted in 2000 by the University of South Alabama's Center for Public Policy (O'Shea & Nicholls, 2003) examined the data from two national surveys—one of all US police agencies with more than 100 sworn personnel and a second of a random stratified sample (by size and region) of 800 agencies with fewer than 100 sworn personnel. The researchers also conducted site visits of large agencies specifically selected for the quality of their crime analysis operations. They found most crime analysts were being asked to focus on criminal apprehension through pattern identification, to identify areas with high crime levels, and to create weekly, monthly, and annual statistics (O'Shea & Nicholls, 2003).

On a smaller scale, Chamard (2003) and Sever, Garcia, and Tsiandi (2008) conducted statewide surveys in New Jersey to examine the use and implementation of crime analysis in the local police departments. Chamard examined 347 agencies and their adoption of crime analysis (i.e., crime mapping). She found overall a small number of agencies used crime analysis

and adoption and use of crime analysis was more common in larger agencies. Sever et al. (2008) found although crime analysis strategies were used in New Jersey police agencies, the level was varied and most agencies did not use advanced methods.

Giblin (2006) examined the incorporation of crime analysis into the police organizational structure and found in a small sample of departments (160) larger agencies were more likely to have formal crime analysis and accreditation standards (i.e., CALEA) played an important role in implementation. Around the same time, two other studies examined perspectives of police and crime analysts on the police/analyst relationship and analysis products (Cope, 2004; Taylor, Kowalyk, & Boba, 2007). Cope (2004) found through interviews with crime analysts and sworn supervisors in the United Kingdom a self-fulfilling prophecy existed in the negative perception police managers had of crime analysts. That is, police managers often asked for information that was not action-oriented. When they received the crime analysis product, and it was not helpful, they blamed the inadequacy of the product on the crime analyst, instead of rethinking their request. In an exploratory survey, Taylor et al. (2007) found analysts had very positive attitudes toward sworn personnel, but they felt as though the sworn personnel, particularly the police officers, were not supportive of them. These two studies seem to imply at this time, there was a cultural disconnect between crime analysts and the sworn personnel.

A few years later, a national survey conducted by the Police Executive Research Forum focused on the level of integration of crime analysis into patrol work (Santos & Taylor, 2014; Taylor & Boba, 2011). The study of 600 randomly selected local US police agencies stratified by agency size, type, and geography found 89% either employed a full-time crime analyst or had a staff member whose secondary responsibility was conducting crime analysis (Taylor & Boba, 2011). Analysis of these data also showed even though an overwhelming majority of departments had a crime analysis capacity, the level of integration of crime analysis in patrol work was fairly low overall (Santos & Taylor, 2014). The researchers found police departments did not use crime analysis agency wide, but only for specific purposes (e.g., directed patrol) and by distinct audiences (e.g., managers used it the most).

In recent years, crime analysts and researchers have begun to dig deeper to understand and highlight the role of the crime analysis in academic publications. Dolly and Shawver (2018), crime analysts and doctoral candidates, discuss their role starting a crime analysis unit and creating the culture necessary for acceptance and use of crime analysis. They examine both the academic and practical considerations of cultural change, aspects of recruitment and selection of crime analysts, and how the tactical, strategic, and administrative crime analysis added value to both the agency and the community.

Scott Keay, a crime analyst, and Stuart Kirby, an academic, write about the evolution of the police analyst and the influence of evidence-based policing in the United Kingdom (Keay & Kirby, 2018). They highlight previous challenges in integrating crime analysis into the police organization and present the benefits of incorporating research into policing through crime analyst and academic partnerships. Michelle Belongie, a working crime analyst, along with Grant Drawve and Hannah Steinman, two academics, talk about their different roles in a partnership to use risk terrain modeling for analysis of traffic incidents in Green Bay, Wisconsin (Drawve, Belongie, & Steinman, 2018). They present their experiences with challenges and successes of establishing a relationship, carrying out work collaboratively, and sustaining their connection. Sanders and Condon (2017) examine crime analysis in Canada to examine its organizational and cultural integration, the technological support and use of crime analysis by police.

Researchers and doctoral students from Florida International University conducted an evaluation of crime analysis work products in the Miami, Fl Police Department (Guerette, Przeszlowski, Lee-Silcox, & Zgoba, 2021). They found after conducting comprehensive training with the analysts, not only was there an improvement in the work product but the use of the products by police administrators increased as well. Other research has found while crime analysts play a pivotal role in evidence-based policing, they are only marginally involved with program evaluation in the police department and determining effectiveness of programs (Piza & Feng, 2017). These are just a few examples but illustrate how both researchers and working analysts are more closely examining the nature and use of crime analysis by police.

Lastly, the most current data on the prevalence of crime analysis in American policing comes from the 2016 Law Enforcement Management and Administrative Statistics (LEMAS) (Bureau of Justice Statistics, 2021). The key question about crime analysis asks how an agency addresses the task of crime analysis. There were 2,784 agencies surveyed and the following is a breakdown of the answers (1.3% missing data):

- 23.4% have a specialized unit with full-time personnel
- 17.6% have designated personnel
- 34.2% conduct crime analysis but do not have designated personnel
- 23.5% do not formally address or have crime analysis

Thus, 41% of all agencies surveyed have either unit or designated personnel doing crime analysis, and almost 75% conduct crime analysis in some way. A breakdown by agency size shows larger agencies are more likely to designate and conduct crime analysis. Of the 839 agencies surveyed with more than 100 officers, 85.6% had unit or designated personnel and 96.7% conducted crime analysis in some way. Of the 468 agencies with between 26 and 100 officers,

41.4% had unit or designated personnel, and 81.6% conducted analysis in some way. It is the smallest agencies that mostly lack a crime analysis capacity, which is likely a large part due to resources and the low number of crimes. Of the 1,347 smallest agencies with less than 25 officers that were surveyed, only 8.4% have unit or designated personnel and 56% conduct some type of analysis.

KEY CHALLENGES FOR CRIME ANALYSIS

The discipline of crime analysis is recognized today as important by government, policing, and academic communities; however, there are still some key challenges. While improvements in quality of professional crime analysis training and of law enforcement data are always a work in progress, two larger level challenges are (1) institutionalizing crime analysis into day-to-day police practice and (2) professionalizing crime analysis as a career.

The challenge of institutionalizing crime analysis into police practice stems from the fact police departments have operated and individuals have been able to do their jobs without crime analysis products for many years (Santos & Santos, 2020b). Even though most departments have analysts, their products are often treated as optional and as a "resource" for officers to use if they want to. Police often think they know, without analysis, where and when to focus their efforts to reduce crime. However, studies have shown officers to command-level personnel in both patrol and investigations are unable to consistently identify and/or are not accurate about where crime clusters are occurring (Bichler & Gaines, 2005; McLaughlin, Johnson, Bowers, Birks, & Pease, 2006). So, in order to get individuals to use crime analysis, they must be trained in it, shown how to use it in their jobs, and be held accountable for doing so. Just as some students do not study if there are no tests to hold them accountable, police will not use crime analysis if it is not a required part of their job. In my own work, I have cocreated a policing approach and organizational model that infuses crime analysis into crime reduction work conducted at every level of the police department. Called Stratified Policing, it is an approach that has shown to change the way police departments operate and make crime analysis a necessary component in the agency (Santos, 2018; Santos & Santos, 2020b).

One challenge of professionalizing crime analysis as a career is developing a cadre of qualified individuals to assume crime analyst positions. To do so, specific undergraduate and graduate education as well as training for professionals from other fields is necessary. Specific college courses and degree programs (e.g., certification programs and area concentrations at both the undergraduate and graduate levels) can not only spark the interest of students in the crime analysis career but also instruct them in crime analysis techniques.

Here at Radford University, there is both a minor in crime analysis and a graduate crime analysis certificate (Radford University, 2021). The minor is

six classes (21 credits) that include classes entitled: Introduction to Crime Analysis and the Profession; Crime Analysis Data and Technology (with lab); Tactical Crime Analysis (with lab); Strategic Crime Analysis (with lab); Statistics; and the Crime Analysis Capstone. Three of the courses have computer labs as a requirement so students learn how to work with police data, use software to conduct common crime analysis techniques, and create real crime analysis and intelligence products. The capstone includes creating a comprehensive portfolio of products that can be provided in a job interview, developing a relevant resume and cover letter, as well as participate in a mock interview. The graduate certificate includes classes where the students examine research on crime analysis and evidence-based policing, learn advance spatial analysis and statistics, as well as apply crime science concepts to practical crime analysis projects.

In the area of career development and advancement, one purpose of this book is to help establish standards in job descriptions and qualifications. The International Association of Crime Analysts has and continues to work to develop standards for crime analysis as a career and its practice. They have developed a national certification process, a handbook that provides basic crime analysis knowledge needed for certification, and a host of training classes (IACA, 2021). Lastly, standardization and development of crime analysis as a profession is also growing in other countries. Most European countries have formal crime analysis functions within their national or state police agencies, as do Japan, Australia, Brazil, South Africa, and other nations. Police agencies in the United Kingdom also have seen a significant push for crime analysis, both within the problem-solving process and tactically. The concerns of crime analysts in the United Kingdom mirror those of their counterparts in the United States.

FUTURE OF CRIME ANALYSIS

The future of crime analysis sits squarely on the shoulders of policing. Crime analysis exists to support police, so it follows its future depends on the future of policing. It is not enough for academics, researchers, and crime analysts themselves to help improve the tools and techniques of crime analysts. Police leaders have to appreciate and value crime analysis as well as incorporate it into standard operational practices. One final note, an informal survey of some of the top analysts in the country revealed some specific things that seem to be on the horizon for the crime analysis discipline. They include:

- Increased expectations by society for police to be data driven and use evidence-based practices
- Increased focus on proactive crime reduction which requires a robust crime analysis capacity

- More emphasis in long-term problem analysis that identify permanent non-law enforcement solutions to crime problems
- Advancements in technology that facilitate better data quality and automation of data access for police, so the crime analyst can produce more meaningful, effective products
- A decrease in administrative crime analysis conducted by crime analysts as a result of the increase in automated data access
- Increased numbers of real-time crime centers that facilitate crime analysis support for immediate incidents

The evolution of the crime analysis profession and its future are all good news to students and others looking to be crime analysts. The policing community and the criminal justice system will be prompted and motivated to fund new crime analysis positions which means more qualified individuals will be needed to fill them. This is already the case as new crime analysis positions are created each year, and it looks like this trend will continue.

THE CRIME ANALYST PROFESSION

Most police departments employ civilian crime analysts. Although not as common, some agencies have sworn crime analysts. This is often the case because the leadership cannot find resources to create civilian analyst positions. In many police departments, especially those under 200 sworn officers, a crime analyst is one of only a few professional support positions. Ideally, a crime analyst walks into the job with knowledge of crime and criminals, policing and police culture as well as data, research, statistical, and technology skills. One person is not likely to have all of these qualifications as they begin a crime analysis career, but may have a strength in a few of these areas and will cultivate the others over time. And, no matter which knowledge and skills the person has or lacks, they already exhibit the ability to think critically, problem-solve, and "figure out" things on their own.

Crime analysts are highly proficient in data collection, data manipulation, statistics, theory, and research methods. The analyst is the police department's authority in examination, research, and assisting other police personnel in doing their jobs more effectively. Successful crime analysts also have knowledge about policing in general, about police culture, and about the characteristics of the community in which they work. Crime analysts have their own style of dealing with people, but to be successful, an analyst can explain complex ideas clearly to many diverse types of individuals (e.g., police officers, managers, city officials, citizens). Crime analysts are able to relate to police officers, work within police culture, think clearly under pressure, defend their views on important issues, and keep a sense of humor. At the end of this chapter, several

profiles of current crime analysts illustrate the varying degree of experience, skill, education, and responsibilities different analysts have.

Crime Analyst Qualifications and Job Descriptions

Some police departments employ only one crime analyst, whereas others have several who function in what is typically called a **crime analysis unit**, or **CAU**. Within a CAU, there can be individuals who fill different crime analysis–related positions. The following are descriptions of the most common types of positions, their roles within CAUs, and their qualifications.

Crime Analyst I

A new and inexperienced analyst is classified as a Crime Analyst I and usually conducts relatively routine crime analysis tasks as well as criminal intelligence duties. They obtain a significant amount of practical knowledge and training in their first year as they work with the police department's specific software and databases. Typically, this position requires an undergraduate degree in criminal justice, political science, sociology, or a related field that includes statistics and research methodology in its curriculum and 1 year of analytical experience. In many cases, a master's degree is seen as the equivalent of a year of analysis experience. Some police departments require applicants for this position to obtain crime analysis certification within a specific period after they start the position. In some cases, the certification is required before hiring, but this is less common.

Crime Analyst II

Individuals can either achieve this level in their current job or be hired at this level. They may work in a unit with other analysts or be the sole analyst in an agency. Compared to the Crime Analyst I, this position holds more responsibility and is expected to conduct more advanced crime and intelligence analysis. An individual in this position may also formally or informally supervise/mentor less experienced analysts. This position typically requires a minimum of a bachelor's degree in criminal justice, political science, sociology, or other related field that includes statistics and research methodology in its curriculum and 3–5 years' working for a law enforcement agency performing research, data analysis, statistics, and working with mapping software, or a graduate degree in criminal justice, criminology, information systems, statistics, or a related field with 2–3 years' experience.

Crime Analyst III

Individuals can either achieve this level in their current job or be hired at this level; work in a unit or be the sole analyst in an agency. This is the senior crime analyst position, and the person may act as the unit's civilian supervisor. Compared to the Crime Analyst II, this position holds even more

responsibility, conducts complex crime and intelligence analysis and research projects, and represents the unit in high-level department meetings. This individual is responsible for training lower-level analysts on department processes and procedures; assisting with planning, assigning and reviewing the work of other analysts; and is part of hiring and interviewing process of new analysts. This position typically requires a graduate degree in criminal justice, criminology, information systems, statistics, or a related field with 5–10 years' experience working for a law enforcement agency performing research, data analysis, statistics, and working with mapping software.

Specialty Crime Analyst

A specialty crime analyst is hired to conduct a particular type of crime analysis. An agency with a relatively large CAU may prefer to employ crime analysts who are specialists (i.e., who have their own individual sets of specialized skills and knowledge) rather than generalists (i.e., who are cross-trained so all members of the unit have similar skills and knowledge). In some cases, agencies may receive grant funding that requires crime analysts to analyze particular types of crime or other activity. For police agencies, the advantage of having specialty crime analysts available is these individuals have substantial skills and knowledge in their particular areas of crime analysis; the disadvantage is their work cannot be shared easily with other analysts, so if a specialty analyst goes on vacation, attends training, or resigns, no one else can conduct the work until they return or another analyst with the same specialty is hired.

There are numerous types of specialty crime analysts, and the education and experience required for these positions varies by specialty. In general, however, the position of specialty crime analyst starts at the Crime Analyst II position since it requires particular proficiencies that require a higher level of education and experience. Some examples include the following:

- *Tactical crime analyst:* This type of analyst conducts only tactical crime analysis and does not produce long-term reports or statistics.
- *Problem analyst:* This type of analyst conducts analysis to resolve long-term, large-level crime and disorder problems. This position often requires an advanced degree and knowledge of program evaluation and evidence-based policing (see Chapter 3).
- *Specific crime (type) analyst:* This type of analyst conducts tactical, strategic, and administrative crime analysis having to do with one particular crime and is likely to work closely with detectives. These positions are more common in very large agencies that have many analysts and/or have developed a long-term task force to address a specific crime type. Examples include sex crime analysts, homicide analysts, violent crime analysts, property crime analysts, and robbery crime analysts.

- *School safety analyst:* This type of analyst conducts analysis on the safety in and around schools, working directly with school administrators and school resource officers.
- *Repeat offender analyst:* This type of analyst would focus on analyzing arrest and offender data to produce repeat/chronic offender lists and in-depth analysis of chronic offenders' criminal histories. These analysts often work with the criminal investigations division and/or support a repeat offender or intelligence-led policing (see Chapter 3) unit.
- *Geographic information systems analyst or spatial crime analyst:* This type of analyst specializes in the use of geographic information systems and conducts spatial analysis of crime and various types of police activity. Salaries for GIS analysts are typically higher than those for crime analysts because of the specialized technical skills required and because police agencies compete for qualified analysts with private companies offering high salaries. These positions are most common in large agencies where there are many different crime analyst positions.

Crime Analysis Supervisor

The crime analysis supervisor is a person with substantial crime analysis knowledge and experience who supervises a crime analysis unit. This job title is not applied to police managers (sworn personnel) who supervise the crime analysis function as part of their other sworn duties. The position of crime analysis supervisor is considered to be a "working" position because it involves hands-on crime analysis work. The individual filling this position is a career crime analyst. The key responsibilities of a crime analysis supervisor are to represent the interests of the CAU at high-level organizational meetings (such as command staff and patrol or investigations operations meetings), to lead the development of CAU goals and objectives, and to be knowledgeable about the crime analysis discipline regionally, nationally, and internationally. This position has similar requirements to the Crime Analyst III position with the added requirement of having previous supervisory experience.

Federal Analysts

Most Federal law enforcement agencies employ civilian analysts who support their sworn law enforcement officers. These analysts primarily conduct criminal or national intelligence at the regional, state, national, or international levels. The education and years of experience are similar to local and county crime analysts, but criminal intelligence analysts focus on organized crime, and in the case of national and military intelligence on domestic and foreign "enemies" of the state. Because of this, a Federal analyst position normally requires a higher security clearance than crime analysts in police agencies. There are many analyst positions in a variety of different agencies, including but not limited to, the FBI, High Intensity Drug Trafficking Area

(HIDTA), DEA, ATF, Homeland Security, Department of Defense, State Department, military branches, CIA, and NSA. There are also civilian analysts who work with both Federal and local prosecutors supporting both investigations as well as long-term crime analysis initiatives.

Private Sector Analysts

There are many crime analyst positions in the private sector. These positions have similar requirements and apply most of the skills of crime analysts. The difference is they analyze crime occurring within the company's business dealings. They focus on apprehension of offenders who could be customers or employees, but also on preventing criminal opportunities and protecting the company. This focus is in addition to cybersecurity. Private sector crime analysts examine patterns and trends of crime at the local level "on the ground" at physical places as well as online. Some examples of some of the larger companies are Walmart, Target, Walgreens, Google, and Facebook, but there are many smaller scaled businesses that have analysts as well. Lastly, there are high-value net worth families who have security details and analysts that assist. Lastly, some analysts work for technology and software companies to assist them working with police agencies on specific initiatives and processes, such as ESRI, Lexis/Nexis, Safir Intelligence Group, and National Center for Missing and Exploited Children.

Positions Associated with Crime Analysis

Police agencies often engage student interns to assist in crime analysis units and provide students practical experience with crime analysis. **Interns** can be either undergraduate or graduate students who work in the unit for college credit. **Internship programs** are beneficial to both police departments and their interns. Interns not only help departments by performing crime analysis duties, but they also learn the skills they need to become crime analysts and gain experience working in the professional law enforcement environment. Crime analysis interns typically come from criminal justice programs, but can also be students from sociology, political science, geography, psychology, and computer science. For example, a police department that is instituting a geographic information system might look for geography majors, whereas a department looking to conduct tactical analysis might recruit criminal justice majors.

Individual academic programs typically administer the internship programs through which student interns are placed. These programs usually require students work as an intern for a minimum of one semester (the number of hours per week varies with the number of course credits given), document their experiences through field notes, and write a final paper for a grade. Interns handle many different tasks within CAUs, including tactical data entry, data analysis, production of monthly strategic reports, and assisting with in complex analysis projects.

One note of caution for students about doing an internship is police departments often put applicants through a screening process like that used for full-time crime analysts and other civilian employees (e.g., lie detector test, extensive background checks, drug testing). Thus, any illegal behavior in which students have taken part will have a significant impact on their being accepted and their ability to work as an intern and ultimately as a crime analyst. Lastly, in addition to internships at local, county, state, and university police agencies that provide students good experience and a "foot in the door" of the analysis world, internships are also available in Federal agencies that employ analysts.

Police departments, especially larger ones, may employ an **embedded criminologist**. This person is not a crime analyst but may work closely with the analyst on particular projects as well as request data and products from the analyst. This person typically holds a doctorate degree and/or is a researcher who is employed full-time with the police department. The position may be permanent or may be funded through a grant for several years. The embedded criminologist is an independent, unbiased police employee with expertise in criminology, criminal justice practices, analysis, statistics, research methodology, and evaluation. Embedded criminologists carry out research that supports an organization's mission and collaborate to develop programs, introduce and implementing evidence-based strategies, and evaluate police practices (Braga & Davis, 2014). Their focus may be on crime reduction but it may also be on any range of police topics and issues, such as technologies (e.g., body worn cameras), procedures (e.g., use of force), and community concerns (e.g., legitimacy and trust with the police).

Finally, a **pracademic** is a sworn officer (at any rank) who has a graduate degree and training in research. As an employee of the police department, the pracademic is often assigned to a research or administrative section. This person is not a crime analyst but may work closely with the analyst on particular projects as well as request data and products from the analyst. Ideally, sworn officers in these positions identify evidence-based practices, assist in their implementation, and conduct evaluations. They focus on a wide range of police topics and issues within the department beyond the scope of crime analysis. They may also serve as the person whose task is to stay up on current innovations and research in policing and effectively communicate them to police management for decision-making (Willis, 2016).

Crime Analysis Units and Staffing

There are several factors that impact the structure and staffing of a crime analysis unit. The type of work an analyst and/or a CAU does can depend on where they fall in the organizational structure. If they fall under the patrol division, analysis products will focus more on where and when crime occurs to help deploy officers. If they fall under criminal investigations, analysis will be more focused on offenders and supporting investigations of individual

crimes. It is recommended the crime analyst and/or the CAU unit be autonomous and not be located within a specific operational but report through an administrative section to the chief's office to ensure it is accountable to the entire organization (Gallagher et al., 2017; Santos & Santos, 2020b).

In terms of the number of analysts a police department should have, one recommendation is a department hires one analyst for every 1,500 UCR part I crimes, or 1,800 NIBRS Group A reports (Gallagher et al., 2017). However, this does not account for departments that serve fairly large communities with low levels of crime. These departments answer a lot of calls for service, and crime analysis is still required for a wide range of activities (e.g., long-term problem analysis, examination of domestic violence, disorder, traffic, quality-of-life issues, conducting statistical reports). In these departments, the number of officers reflects a "busyness" factor, so agency size is another way to decide the number of analysts a department should have. Thus, another recommendation is police departments with 100 sworn officers have two analysts and then one analyst for every additional 100 officers. Having at least two analysts at the outset ensures crime analysis is being conducted even when one person is on vacation, sick or in training; there is cross-training and collaboration; and there is an extra layer of review for quality control to ensure relevant and accurate products are disseminated by each analyst (Santos & Santos, 2020b).

Another factor is how departments with multiple analysts assign responsibilities to individual analysts. In larger agencies with more than five or so analysts, individuals are assigned by geographic patrol areas (e.g., each analyst covers all analysis for a particular district, zone, precinct), by division (e.g., patrol, criminal investigations, headquarters), by crime type (e.g., robbery analyst, homicide analyst, burglary analyst), and/or by type of analysis (e.g., crime intelligence, tactical, strategic, or administrative crime analyst). Decisions about where the analysts are physically located have to be made as well. For example, should the analyst's office be at headquarters or in a substation? Should the office be near the chief, near patrol, or criminal investigations offices? These considerations often depend on nature of the police facilities and resources, but with the use of email, intranets, and electronic dissemination of products, it is not as necessary for analysts to be near operational personnel as it was in the 1990s and early 2000s.

Crime Analysis Unit Strategic Planning

When creating a new crime analysis unit or improving the capabilities of an existing unit, a **strategic plan** can be developed to outline strategies and direction, lay out expectations, and help guide decisions about how work is done and how to allocate resources. At the outset, a strategic plan is developed in line with the agency's strategic goals, includes specific short- and long-term goals, is realistic in terms of allocating resources (e.g., funding,

time, personnel capabilities), and describes the future needs as well as discuss the substantive areas of work of the unit.

The first step is to understand the current state of the agency and its crime analysis capabilities, the police department's data sources and data quality, and available hardware and software that can be used for crime analysis. The second step is to determine the crime analysis "needs" based on a review of the crime analysis profession's standards and best practices along with information gathered from department personnel through "ride-along," interviews with supervisors, managers, and commanders, as well as attending departmental meetings. A departmental survey might be disseminated to gather information from a wider range of individuals, and a committee could be created of individuals from different divisions and ranks to discuss crime analysis needs. Observation conducted on ride-along and in meetings would focus on determining the level of understanding of crime analysis by sworn personnel in the agency and on what type of crime reduction/prevention strategies are being employed.

The third step is writing the plan which would describe the current crime analysis capacity and needs, and both short- (1 year) and long-term (5 years) goals. The plan might include the following:

- *Structure:* The number and type of personnel conducting crime analysis full or part time and their positions. Job duties and responsibilities for each position as well as the location of the unit within the chain of command and the department's physical buildings.
- *Functions/products:* The types of analyses conducted, description of standardized products, and how they are distributed.
- *Data issues:* Problems with crime analysis data quality related to timeliness, accuracy, and completeness; limitations and improvements; additional data sources needed to conduct analysis required in the plan.
- *Technology:* The hardware and software used for crime analysis, detailed replacement and update plans, and any additional needs.
- *Training and promotion*: Local and national training opportunities and a schedule based on funding and personnel needs; a structure for advancement with the unit/department; and suggestions for realizing the structure if not in place.
- *Policies and procedures:* Policies and procedures of the unit that are updated and approved by the agency head. Methodologies for routine tasks and comprehensive analyses (e.g., data entry and cleaning, staffing and redistricting analysis).
- *Goals:* Both short-term (e.g., 1 year) and long-term (e.g., 3–5 years) goals that focus on the substantive work of the unit as well as personnel, resources, and technology.

International Crime Analyst Perspective

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Austria's crime analysis started in 2003 as a unit at the new Bundeskriminalamt (i.e., central office for nationwide fight against crime). From July 2005, when Austria merged its 14 city police forces and Gendarmerie (all other areas) into one Federal police force (Bundespolizei), crime analysis units were set up in all nine states of Austria. Their activities were initially underestimated, but soon they became an indispensable part of police work. All analysts were trained according to international standards and receive ongoing training, at home and abroad. These units work on a wide range of tasks and are referred to as the Operational and Strategic Crime Analysis Units.

Operational Crime Analysis: The operational crime analysis provides support for investigations as well as initiates evaluations and provides analysis for decision-making that furthers investigative approaches in complex criminal cases. The aim is to provide professional support for case-related investigations and to improve the quality of day-to-day criminal police work.

Strategic Crime Analysis: The strategic crime analysis deals with medium- and long-term crime developments with characteristic manifestations of certain areas of crime, such as future developments, forms and causes of crime, situation descriptions and pictures, risk analysis etc. It also examines the criminogenic factors of possible future events in order to make comprehensible projections. With strategic crime analysis, there are two subgroups. The first is spatial crime analysis with the primary task of placing crime data in a geographical context to illustrate how environmental factors in social space influence crime. The second is "criminal investigation department's information logic which is a largely automated processing of data and its presentation for analytical use. This is also a constant core task, as criminal investigation data are processed into usable information and made available to users with automation support within the framework of reporting (crime monitor, situation reports, etc.) throughout the Federal Ministry of the Interior.

Real-Time Crime and Fusion Centers

The crime analysis unit specifically includes personnel who conduct the types of analysis discussed in this book. Two other types of entities—the real-time crime center and the fusion center—also include personnel who are tasked with analytical work. However, the work of the RTCC analyst focuses on analyzing individual crime and events in "real time" and the fusion center analyst focuses on regional, national, and international crime and events (e.g., terrorism, human

trafficking). There is some overlap among personnel and analysis tasks; however, it is more common for a crime analyst to be asked to do work in an RTCC or a fusion center, than personnel from an RTCC or fusion center be asked to do crime analysis.

The real-time crime center (RTCC) is a fairly new innovation in law enforcement, coming about around 2005. An RTCC supports a police department's, particularly the patrol division's, immediate and real-time analysis needs for individual incidents (Guerette et al., 2021). Ideally, an RTCC is staffed 24 hours a day, 7 days a week, and staff monitor the police radio and assist with looking up information as well as proactively monitoring incidents through technology (e.g., gunshot detectors, license plate readers, facial recognition, social media, surveillance cameras). RTCC personnel assist officers on calls, during investigations, as well as during crimes in progress. They can also play an important role in special events, protests, and riots by monitoring activity in the field as well as on social media in real time.

The implementation of an RTCC is very different across police agencies depending on resources available and the focus of the city, county, or state government in which the RTCC is housed. To date, no common structure or function(s) have been established for RTCC, and most local police departments do not have an RTCC, primarily because of the resources it requires to set up and staff. Larger agencies are more likely to have one and will generally utilize it to incorporate a wide range of law enforcement software and technology. They will staff it with personnel to assist response in high-crime areas, to serious crimes in progress, for large-scale public events, and/or high-profile or highly recidivistic offenders in the community. Dedicated RTCC personnel can be either or both civilians and sworn personnel who are trained in the specific technology used in the RTCC, intelligence gathering, and investigative techniques.

Fusion centers have been around longer than RTCCs and were implemented in the United States systematically after 9/11. The Federal government provided funding for these regional data-sharing centers that operate almost like a large task force. Most broadly, they are a "collection of two or more law enforcement agencies working together and sharing threat-related information to combat complex criminal or terrorist activity" (Gallagher et al., 2017). Fusion centers typically address large-scale and long-term problems that require regional collaboration and data sharing, for example, homeland security, human trafficking, and drug trafficking.

Most fusion center personnel are sworn and sent by local, county, state, federal, and tribal agencies to work together in a single, regionally central location, typically in a major metropolitan area. Fusion centers receive federal funding and assistance from Federal partners for standardized training, technology, funding, and additional personnel (e.g., Federal agents and analysts). Dedicated fusion center analysts work on long-term initiatives, conduct analysis of regional (versus local) crime, and typically have a higher-level security clearance than crime analysts. Table 1.1 summarizes the components and differences between real-time crime centers and fusion centers.

TABLE 1.1 Summary of Real-Time Crime and Fusion Centers

	JURISDICTION	ROLE	FUNCTION	CRIME TYPES	PARTNERSHIPS	TECHNOLOGY
Fusion Center	State or Regional	External, Horizontal or Vertical Structure	Intelligence collation, analysis and dissemination; Regional risk assessments	Threat and hazards approach; Jurisdictional needs	Local; State; Federal; Private	Access to local state and federal databases
RTCC	Municipal, Metropolitan, or County	Internal, Horizontal or Vertical Structure	Real-time information sharing capabilities; Surveillance; Postincident investigative support	Disorder and disturbance calls; Property crime; Violent crime; Jurisdictional needs	Local; State; Federal; Private	Access to local state and federal databases; CCTV and video analytics; Automated Detection Systems; License plate readers; Facial recognition

SOURCE: Adapted from Guerette et al. (2021, p. 11).

CRIME ANALYST PROFILES

Crime analysts from around the country have provided information on their own backgrounds, skills, responsibilities, and thoughts about their careers as analysts. These are provided for students to get a sense of who crime analysts are and what they do. For definitions of the types of crime analysis, refer to the glossary or see Chapter 4.

AMANDA BRUNER

Matthews (North Carolina) Police Department

Crime Analyst

Education and Crime Analysis Experience

- Bachelor of arts, criminal justice, Michigan State University
- Master of science, law enforcement intelligence and analysis, Michigan State University
- 1 year and 4 months as a crime analyst, Matthews Police Department
- 4 months as adjunct professor, Radford University
- 6 months as a crime and intelligence analyst student assistant, Michigan State University Police Department

Previous Related Work Experience

- 5 months as an intelligence specialist, Bank of America
- 4 internships with law enforcement agencies at the local and federal level

Breakdown of Responsibilities

- 25% tactical crime analysis
- 25% investigative crime analysis
- 25% strategic crime analysis
- 25% administrative crime analysis

Amanda's Thoughts on Being a Crime Analyst

While pursuing my undergraduate degree, I interned with a variety of law enforcement agencies at the local and federal level, but upon graduation, I began working in the private sector. I quickly realized my true passion is in

public service, and fortunately for me, the Matthews Police Department was looking to start a Crime Analysis Unit. The Stratified Policing Model provided the agency with a detailed guide on how to integrate crime analysis into the organization. Over the course of the last year, I have seen significant improvements in interdepartmental communication and am beginning to see reductions in crime and quality-of-life issues in our identified problem location/area(s). I absolutely love that no two workdays are ever the same, and there are a variety of paths/technology programs to pursue to hone my skill set. For example, I've been teaching Strategic and Administrative Crime Analysis online through Radford University under the guidance of Dr. Rachel Santos. Not only has this opportunity allowed me to advance my knowledge within crime analysis, but I am able to offer the students a practitioner's viewpoint on the field and how it continues to evolve.

CHERYL DAVIS

Port St. Lucie (Florida) Police Department

Crime and Intelligence Analyst III

Education and Crime Analysis Experience

Bachelor of arts, criminal justice, Florida Atlantic University

Master of criminal justice, Boston University

15 years as a crime and intelligence analyst, Port St. Lucie Police Department

Previous Work Experience

6 years as paralegal, private law practices

Breakdown of Responsibilities

45% tactical analysis

25% investigative analysis

20% strategic analysis

10% administrative analysis

Cheryl's Thoughts on Being a Crime Analyst

While my initial intention was to apply to law school after completing my undergraduate degree, I could not deny my strong interest in my crime

analysis classes. Changing my career path is a decision I have never regretted. I am very fortunate to have been part of my agency's implementation of crime analysis as part of its overall policing model. My role as an analyst is extremely rewarding as my work is utilized and valued every day by my colleagues and department. Watching how crime analysis has developed, I see more and more agencies rely on the work analysts do as a critical part of their organizations. Crime analysis is a profession I highly recommend.

International Crime Analyst Perspective

Matt Thomson

Forensic Intelligence Analyst (Firearms Intelligence)

Australian Federal Police

Canberra, Australia

In 2016, as part of the Australian Federal Police's (AFP) increased commitment to combat illicit firearm activity within Australia, the AFP Forensic Intelligence and Geospatial team (FORINT) expanded to include the remit for Firearms Intelligence. My main role as a Forensic Intelligence Analyst is to identify new lines of inquiry for operational decision-makers, particularly as it relates to disrupting firearm trafficking networks, serious and organized crime, and matters of national security. I do this by using both forensic information (e.g., ballistics, biometrics, tool marks) and my own technical expertise and knowledge in firearm-related criminal activity, to identify convergences, potential candidates for investigation, targetable vulnerabilities to disrupt trafficking networks, or generate leads for other intelligence or investigative areas.

I also collaborate with and support state- and territory- policing partners, identifying offenders within the community, and provide actionable intelligence for detectives to act on, for example, identifying the location of illicit firearm workshops, assessing the capabilities of criminal actors, and highlighting items of interest linked to the criminal activity, such as certain tools and equipment, cash, explosives, or illicit firearms. The local police force is able to use this intelligence to form the basis of disruption activity, such as search warrants. By taking this collaborative approach with law enforcement partners, I get to actively support their work in making the community safer.

BRIAN KENT

Fort Myers (Florida) Police Department

Crime Analyst

Education and Crime Analysis Experience

- Bachelor of arts, geography, University of Wisconsin-Milwaukee
- Graduate certificates in geographic information systems (GIS) and crime analysis, University of Wisconsin-Milwaukee
- 2 years as a crime analyst

Previous Related Work Experience

- 2 years as a grade school math teacher

Breakdown of Responsibilities

- 40% tactical crime analysis
- 25% investigative/intelligence analysis
- 25% strategic crime analysis
- 10% administrative crime analysis

Brian's Thoughts on Being a Crime Analyst

To me, crime analysis is the perfect combination of criminal justice, geography, and data analysis. I have always been interested in mapping, so I was happy to discover the field of crime analysis as one that allows me to work with spatial data in a law enforcement setting. However, the role of an analyst is more than just mapping. Analysts are able to use various resources to produce information that is going to be useful for officers and command staff every day. Even though technology keeps getting more and more advanced, working at the Fort Myers Police Department has shown me how important it is that analysts remain involved in the decision-making process. Crime analysts should understand new technology and know how to use it appropriately. There consistently seems to be something new to learn in the areas of crime analysis and intelligence. I am glad I can be a part of this innovative profession.

TARA SHAFNER

Dayton (Ohio) Police Department

Senior Crime Analyst—Crime Analysis Unit Supervisor

Education and Crime Analysis Experience

- Associates and Bachelors of science, criminal justice, University of Cincinnati
- 6 years as a crime analyst, Dayton (Ohio) Police Department
- Analytics and Intelligence Certification

Previous Related Work Experience

- 1 year as a loss prevention analyst supervisor

Breakdown of Responsibilities as a Crime Analyst Supervisor

- 25% tactical analysis
- 15% investigative analysis
- 30% strategic analysis
- 30% administrative analysis

Tara's Thoughts on Being a Crime Analyst

I truly can't think of a better career path for myself as I have a deep passion for the law enforcement field and I'm a chronic over thinker! Crime analysis is the key pillar for law enforcement agencies to combat and prevent crime! There have been several times I've been asked to give a fairly simple analysis on something, but the deeper I dive in, the more focused and meaningful the analysis becomes, which only benefits the community and the department. Because of this, my department not only respects me and my team, but also trusts they will receive the best information available. Of course, I can't let my "overthinking" receive all the credit for our success because crime analysis is an emerging field that is always improving. A crime analyst stays on top of current national and local crime trends, researches how other departments are combatting crime, and thinks beyond what they do every day. Crime analysis is truly what an analyst can make it. Yes, in the general sense, analysts have parameters in which they do their jobs, but going above and beyond what is "normal" practice will get the best outcome for the community, the department, and the analyst!